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advances a theory of dental succession which is opposed to the prevalent one, and which, as it appears to us, accounts better for the facts. It is thus stated (p. 500): "In the Batrachia and Reptilia there are many sets of teeth developed during the life of the individual, of which the first arises *de novo*, and all the succeeding ones are derived from that which precedes it. Altogether, I am disposed to regard the diphyodont mammalian dentition in the same light: those teeth which take their origin primarily from the epithelial lining of the mouth are strictly homologous with the first set of the lower vertebrates. This would include in the first set the deciduous incisors, canines, molars, and the first true or permanent molars. The second set of the batrachian and reptile would be represented by the permanent incisors, canines, premolars, and second true molar. The third succession would be represented by the last molar of the diphyodont dentition."

The monograph is well illustrated by wood engravings.

Kedzie's Gravitation, Solar Heat, and Sun-Spots.¹—Professor Kedzie's interesting book makes a sensible addition to the light necessary to the understanding of that form of energy known as gravitation. He starts with the kinematists in refusing to credit the existence of attraction, or the action of matter where it is not, and uses the Le Sagian idea of external pressure as the principle of gravitation. But he differs from Le Sage in not admitting this force to be derived from hypothetical molecules, and in asserting that it is the mechanical energy due to vibrations of the ether moving towards the sun. He goes further and attempts to account for the source of this energy. He regards it as the equivalent of the heat which is radiated from the suns of the universe into space in such prodigious quantities, which is metamorphosed into mechanical energy and returns to its source in this form. The reasons for believing in the return are thus stated. Assuming space to be infinite, and to be full of the ether, he conceives the latter to be full of energy. Any addition to this energy from any source will cause an overflow, which will naturally be in the direction of the region from which the emission took place. Hence between the sun and the surrounding space there is an endless cycle of outgoing and incoming energy. The reason why this returns as mechanical and not as thermal vibrations he supposes to be as follows. The conversion of mechanical motion into heat being caused by resistance or contraction of space, the reverse process of converting heat into mechanical movement will result from the opposite physical condition; *i.e.*, the reduction of pressure and expansion of space.

¹ Solar Heat, Gravitation, and Sun-Spots. By Professor J. H. Kedzie. 8vo, 1886. S. C. Griggs & Co., Chicago.

Hence heat is thus changed at a proper distance from the sun. The only adverse criticism we have to offer to this theory follows Professor Kedzie's assumption that the physical basis of universal energy (the ether) is of infinite extent. If this be assumed, his other assumption, that it is *full* of energy, falls to the ground: it could never get full, and energy radiated into it would be truly lost and would never return. If, now, the ether be supposed to have a limiting boundary, Professor Kedzie's theory has a much more certain basis, and, indeed, so far as regards the necessary return of energy, may be fully accepted.

Professor Kedzie advances the theory that sun-spots are dynamic shadows or regions of lower temperature. These are due to the diminution of the quantity of heat generated on the surface of the sun in consequence of the interception and appropriation as gravitation by the planets, of the energy returning to the sun from space.—C.

Cope's Origin of the Fittest.¹—Under the title of "Origin of the Fittest" Professor Cope has collected into book form the various essays which he has published during the last twenty years upon the subject of evolution. During this time Professor Cope has won for himself a leading position among American naturalists, not only as an investigator, but as a thinker. To him is largely due the origin and growth of what is sometimes called the American school of evolution, or Neo-Lamarckism. It is in the essays embodied in the book before us that he has advanced his views and formulated the beliefs of this school.

It is to be regretted that Professor Cope did not see fit to revise these essays and arrange the subject-matter in them into a systematic form. As it is, he has simply reprinted them as they were originally published, with only here and there a note. Some of the chapters are prize essays, some detail results of original investigation, and some were popular lectures. They were written at various times and for all sorts of purposes. There is a deal of repetition and self-quotation. Published in this form, there cannot fail to seem a lack of unity. The reader finds difficulty in discovering any obvious thread to bind the essays into one book, and much of the interest and suggestiveness is lost thereby. Professor Cope promises us in the—let us hope not distant—future a systematic summary of the subject. But this book must be taken for what it is intended,—not as a separate publication or a connected summary, but simply as a collection of the writings of the author.

In the pages of this book may be found the views of the American Neo-Lamarckian school; for although it contains the

¹ The Origin of the Fittest. By E. D. Cope, A.M., Ph.D. 8vo, November, 1886. D. Appleton & Co., New York.